

recording or reproducing operation, the pickup units are moved for refuge. This novel setup shortens the wait time until disc recording or reproducing, as compared with the conventional setup in which a disc is loaded in a pickup unit, which is then moved to its dedicated position at which recording or reproducing is performed.

Further, according to the present invention, at least two of the plurality of pickup units are moved in the stacked state. This novel setup shortens the moving distance of the pickup units, as compared with the conventional setup in which the plurality of pickup units are moved separately. This in turn quickens the disc handling operation from receiving a command up to the recording or reproducing of a plurality of discs as instructed.

Still further, when one of the plurality of stacked pickup units is moved, if another pickup unit exists along the moving locus of that one of the plurality of stacked pickup units, both pickup units move in cooperation; if another pickup unit does not exist on the moving locus, both pickup units move separately. This novel setup contributes to the stabilization of the above-mentioned recording or reproducing operation.

The above and other objects, features and advantages of the present invention will become more apparent from the accompanying drawings, in which like reference numerals are used to identify the same or similar parts in several views.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the present invention will become more readily apparent from the following detailed description when taken in conjunction with the accompanying drawing wherein:

FIG. 1 is a side view illustrating the basic constitution of the disc apparatus practiced as one preferred embodiment of the invention;

FIG. 2 is a side view illustrating the disc apparatus practiced as another preferred embodiment of the invention;

FIG. 3 is a side view illustrating the disc apparatus practiced as another preferred embodiment of the invention;

FIG. 4 is a side view illustrating the disc apparatus practiced as another preferred embodiment of the invention;

FIG. 5 is a side view illustrating the disc apparatus practiced as a different preferred embodiment of the invention;

FIG. 6 (A) is a schematic diagram illustrating a constitution of the disc apparatus according to the invention with discs stacked perpendicular to the bottom of the apparatus; and

FIG. 6 (B) is a schematic diagram illustrating a constitution of the disc apparatus according to the invention with discs stacked in parallel to the bottom of the apparatus.

#### DETAILED DESCRIPTION OF THE EMBODIMENTS

This invention will be described in further detail by way of example with reference to the accompanying drawings.

Now, referring to FIG. 1, reference numeral 1 indicates a magazine storing a plurality of optical discs 1a through 1j (the optical discs herein denote a music CD (Compact Disc), a video CD, a photo CD, a CD-ROM, and a DVD (Digital Video Disc) for example, sometimes referred to simply as discs hereinafter) at equal intervals of distance. In the lower portion of the drawing, reference numeral 100 indicates a

first pickup unit, reference numeral 101 a disc motor for rotationally driving a disc, reference numeral 102 a turntable, reference numeral 103 a damper that is magnetically chucked onto the turntable 102, reference numeral 104 a first pickup for recording or reproducing information signals on the disc by light beam radiation (the pickup denotes herein a multi-pickup capable of recording or reproducing discs), reference numeral 105 a holder of the first pickup 104, reference numeral 106 a pin providing a pivot for swiveling the holder 105 in the direction c when a disc is loaded into the first pickup unit 100, reference numeral 107 a control circuit for controlling operations of the first pickup unit 100, reference numeral 110 a digital signal processor connected to the first pickup unit 100, reference numeral 170 a disc loader for passing discs between the pickup unit 100 and the magazine 1, and reference numeral 180 a pickup unit drive for moving the pickup unit 100 along guide shafts 5 and 6 in the direction a or the direction b.

It should be noted that, in FIG. 1, reference numeral 200 indicates a second pickup unit and reference numeral 300 a third pickup unit. These pickup units are the same as the first pickup unit 100 in construction, so that the components similar to those previously described are denoted by generally the similar reference numerals. For this reason, the constructions of the pickup units 200 and 300 will not be described. Reference numeral 900 indicates a system control circuit that controls the operations of the first, second, and third pickup units 100, 200, and 300.

Referring to FIG. 1 again, the pickup unit 100 and the pickup unit 200 are disposed in a closely stacked manner and in a standby state. Note that, however, this position is arbitrary, not dedicated.

With both pickup units being in this state, when a command comes to reproduce a disc 1c, a disc 1d, and a disc 2c stored in the tray 1, the system control circuit 900 of FIG. 1 controls the pickup unit drives 180 and 280 such that the same move the first and second pickup units 100 and 200 in the direction a of FIG. 1. Consequently, the first and second pickup units 100 and 200 move in the direction a while maintaining the stacked relationship indicated by solid lines of FIG. 1. The stack stops moving when the first pickup unit 100 has reached a position indicated by broken lines of FIG. 1. When the disc loader 170 feeds the disc 1c from the magazine, the disc 1c is pulled out to a position indicated by broken lines by rotating a roller, not shown, constituting the disc loader 170. Then, when the holder 105 holding the first pickup 104 and other components is moved in the direction c, the disc 1c is inserted in place between the turntable 102 and the damper 103, the inserted disc being indicated by broken lines as shown in FIG. 1.

With the disc 1c being in this state, the control circuit 107 performs control such that the disc 1c is fast rotated in the direction d, the first pickup 104 scans the disc in its radial direction, and known tracking servo and focus servo are performed for recording or reproducing the disc 1c. At the same time, the system control circuit 900 controls the pickup unit drive 180 to move the first pickup unit 100 from the position indicated by broken lines to a position indicated by dot and dash lines for refuge. Consequently, the second pickup unit 200 traveling together with the first pickup unit 100 moves from the position indicated by broken lines at which the disc 1d can be reproduced to a position under that position by one disc to stop. In this state, the disc loader 270 pulls in the disc 1d in the same manner as described above to load the disc 1d between the turntable 202 and the damper 203. As soon as the disc 1d has been loaded in place, the control circuit 207 performs control such that the disc 1d is